**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Jeffrey D. Rupp

Serial No.: 10/707,569 Group Art Unit: 3661

Filed: December 22, 2003 Examiner: Hernandez, Olga

Title: SINGLE VISION SENSOR OBJECT DETECTION SYSTEM

Atty. Docket No.: 810821465 (FGT 1852 PA)

**I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Appeal Brief – Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on:**

**April 11, 2005** **Jo Anne Croskey**
**(Date of Deposit)** **(Signature)**

# APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

The following Appeal Brief is submitted pursuant to the Notice of Appeal filed February 10, 2005, in the above-identified application.

## I Real Party in Interest

The real party in interest in this matter is The Ford Global Technologies, Inc. in Dearborn, Michigan (hereinafter "Ford"), which is the assignee of the present invention and application.

## II Related Appeals and Interferences

There are no other known appeals or interferences, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

## III Status of the Claims

Claims 1-20 are currently pending. Claims 1-20 stand under final rejection, from which this appeal is taken. A copy of the claims on appeal is attached as an Appendix.

## IV Status of Amendments

The independent claims 1, 9, and 20 were amended in response to the Non-Final Office Action of July 28, 2004 for clarification reasons. Claim 12 was amended in the Response of December 15, 2004 to correct a drafting error. In both the Response of October 7, 2004 and the Response of December 15, 2004 remarks were provided for the allowance of all currently pending claims. There have been no amendments filed subsequent to the December 15th Response.

## V Summary of Claimed Subject Matter

By way of summary, the present invention is directed to a sensing system for a vehicle, a method of performing safety system operations within a vehicle, and to an adaptive cruise control system for a vehicle. All of the independent claims, namely claims 1, 9, and 20, encompass several points of novelty, and since claims 2-8 and 10-19 depend from claims 1 and 9, respectively, they also contain at least the same points of novelty.

The system and method of claims 1 and 9 have similar limitations. Claims 1 and 9 recite a sensing system for a vehicle and a method of performing safety system operations within a vehicle. The sensing system of claim 1 includes the limitations of a single vision sensor 14 that has a position with coordinates on the vehicle 12. The single vision sensor 14 detects an object and generates an object

detection signal. A controller 16 is coupled to the vision sensor 14 and generates a safety system signal in response to the coordinates and the object detection signal. The method of claim 9 includes similar limitations. The method includes determining the coordinates of only the single vision sensor 14 on the vehicle 12. An object is detected with the vision sensor 14 and an object detection signal is generated. A safety system signal is generated in response to the determined coordinates and the object detection signal. See pages 7-9, paragraphs [0028]-[0031], and pages 13 and 17, paragraphs [0045], [0046], and [0057].

In using a single vision sensor and in performing a safety system operation in response to a known position of the vision sensor on the vehicle, the claimed inventions of claims 1 and 9 minimize the number of vision sensors and related system components needed to perform safety system tasks. A single sensor is utilized instead of multiple sensors.

Applicant has submitted that the term "position" within the claims refers to the coordinates of the vision sensor. In other words, the term "position" refers to any set of numbers that are used to describe and specify the location of the vision sensor within the vehicle.

Claim 20 is similar to claims 1 and 9 and recites an adaptive cruise control system 10, which includes all of the limitations recited in claim 1 and further includes the limitations of a controller 16 that determines the size and up-angle of a detected object in response to the coordinates and the object detection signal. The controller 16 determines the range of the object in response to the size and the up-angle. The controller 16 also reduces the speed of the vehicle 12 in response to the range. See the above stated pages and paragraphs, as well as pages 14-17, paragraphs [0047]-[0056].

Applicant agrees that the prior art within the field of inter-vehicle distance control has included the use of multiple sensors to determine the position of a target. Applicant also agrees that the prior art accounts for different elevations of targets. Applicant further agrees that the prior art adjusts host vehicle speed in response to change in inter-vehicle distance. What is not known or suggested are the several novel aspects of the present invention. All

of the novel aspects of the present invention are not taught or suggested by the prior art separately or in combination. The novel aspects are described in detail below.

What is not known or suggested is the inclusion and sole use of a single vision sensor. What is also not known is the determination of the coordinates of only a single vision sensor. In addition, the generation of a safety system signal in response to the coordinates of a single vision sensor is not known or suggested. Furthermore, the assumption as a default that an object is at the same elevation as that of a vehicle is not known. Moreover, the generation of an object detection signal in response to the assumption is not known. As well, the generation of a safety system signal in response to the object detection signal and the assumption is also not known. On top of that, the determination of the size and the up-angle of an object in response to the coordinates is not known or suggested. Further yet, the determination of object range and the reduction of vehicle speed in response to object size and up-angle are also not known or suggested.

Claim 2 recites a system as in claim 1 wherein the single vision sensor 14 is a single two-dimensional vision sensor. See page 8, paragraph [0029], of the specification.

Claim 3 recites a system as in claim 1 wherein the single vision sensor 14 is a vision sensor selected from one of a camera, a charged coupled device, an infrared detector, a sensor that has a photodiode, and a complementary metal-oxide semiconductor. See page 8, paragraph [0029], of the specification.

Claim 4 recites a system as in claim 1 wherein the controller 16 performs an adaptive cruise control task in response to the safety system signal. See pages 9 and 18, paragraphs [0033] and [0059], of the specification.

Claim 5 recites a system as in claim 1 wherein the controller 16 determines position of the single vision sensor 14 relative to a predetermined reference on the vehicle 12. See pages 13-14, paragraph [0046], of the specification.

Claim 6 recites a system as in claim 1 wherein the controller 16 determines position of the single vision sensor 14 relative to a hoodline 42 of the vehicle 12. See pages 13-14, paragraph [0046], of the specification.

Claim 7 recites a system as in claim 1 wherein the controller 16 determines size and up-angle of the object and in response thereto determines range of the object. See pages 14-17, paragraphs [0047]-[0056], of the specification.

Claim 8 recites a system as in claim 1 and further includes a memory 34 coupled to the controller 16 and stores a predetermined position of the signal vision sensor 14. See page 12, paragraph [0042], of the specification.

Claim 10 recites a method as in claim 9 wherein determining position of a single vision sensor 14 includes determining distance between the single vision sensor 14 and a reference on the vehicle 12. Relative vertical positioning of the single vision sensor 14 is determined relative to the reference. See page 13, paragraph [0046], of the specification.

Claim 11 recites a method as in claim 9 and further includes initially as an assumed default, determining an object to be at a same elevation as the vehicle 12, and generating an object detection signal in response to the initial determination. See pages 13 and 15, paragraphs [0045] and [0050], of the specification.

Claim 12 recites a method as in claim 9 and further includes reducing traveling speed of the vehicle 12 when height and width of the object appear to increase in size. See page 18, paragraph [0059], of the specification.

Claim 13 recites a method as in claim 9 and further includes determining the object to be at a different elevation than the vehicle 12 when the object appears to maintain a same height and width, but change in vertical position. See pages 16 and 17, paragraph [0055], of the specification.

Claim 14 recites a method as in claim 9 and further includes determining object parameters and generating the safety system signal in response to the object parameters. See pages 13-17, paragraphs [0045]-[0057], of the specification.

Claim 15 recites a method as in claim 14 wherein determining object parameters includes determining up-angle of the detected object. See page 14, paragraph [0047], of the specification.

Claim 16 recites a method as in claim 14 wherein determining object parameters comprises determining size and up-angle of the object and in response thereto determining range of the object. See pages 14-17, paragraphs [0047]-[0056], of the specification.

Claim 17 recites a method as in claim 14 wherein determining object parameters includes determining a parameter selected from object range, range rate, height, width, size, and acceleration. See pages 11 and 15, paragraphs [0040] and [0050], of the specification.

Claim 18 recites a method as in claim 9 wherein generating a safety system signal includes generating an adaptive cruise control signal. See pages 9 and 18, paragraphs [0033] and [0059], of the specification.

Claim 19 recites a method as in claim 9 and further includes determining orientation of the single vision sensor 14 and generating the safety system signal in response to the orientation. See pages 13-17, paragraphs [0046]-[0057], of the specification.

## VI Grounds of Rejection to be Reviewed on Appeal

The following issues are presented in this appeal, which correspond directly to the Examiner's final grounds for rejection in the Final Office Action of December 15, 2004, hereinafter referred to as the "Final Office Action", and in the Advisory Action of February 3, 2005, hereinafter referred to as the "Advisory Action":

(1) whether claims 1-3, 5-11, and 13-17 are patentable under 35 U.S.C. 103(a) over Hirabayashi et al. (U.S. Patent No. 5,874,904),

(2) whether claim 4 and 18 are patentable under 35 U.S.C. 103(a) over Hirabayashi in view of Breed et al. (U.S. Patent No. 6,405,132), and

(3) whether claims 12 and 20 are patentable under 35 U.S.C. 103(a) over Hirabayashi in view of Kurahashi (U.S. Patent No. 5,529,139).

**VII Argument**

**A. THE REJECTION OF CLAIMS 1-3, 5-11, and 13-17 UNDER 35 U.S.C. § 103(a)**

Claims 1-3, 5-11, and 13-17 stand fully rejected under 35 U.S.C. § 103(a) over Hirabayashi. Note that claim 19 has not been argued by the Patent Office, but since it depends from claim 9 it is included here for completeness.

In cols. 1 and 2, Hirabayashi discloses the use of a pair of light-receiving devices 3, 4 to determine the position of a target 13B. The light-receiving devices 3, 4 have associated lenses 1, 2. The first lens 1 is positioned forward of the first light-receiving device 3 and the second lens 2 is positioned forward of the second light-receiving device 4. Distance between the lenses 1 and 2 is known and distances between each of the lenses 1 and 2 and each of the light-receiving devices 3 and 4 is known. Distances $a_{L1}$ and $a_{R1}$ between vertical lines extending through the centers of the lenses $O_L$ and $O_R$ and the light-receiving devices 3 and 4 are determined. From the known and determined distances the inter-vehicle distance between the host vehicle 13A and the target vehicle 13B is determined.

With respect to claims 1 and 9, the Final Office Action states that Hirabayashi discloses a single vision sensor having a position and generating a safety system signal in response to that position, and in so doing refers to Figures 1, 7, 8, 14, 19, and 21, as well as cols. 1 and 2 of Hirabayashi. Applicant submits that Hirabayashi discloses the use of multiple sensors for determining inter-vehicle distance. Hirabayashi does not disclose the generation of a safety system signal in response to a determined or known position of a single vision sensor.

Although Hirabayashi discloses the use of multiple sensors and one may assume that the sensors have associated positions on a vehicle, Hirabayashi does not determine the actual position of the sensors, have knowledge of their position, or suggest the like. Note any object within or external to a vehicle has a position in which it is located, however, that does not imply that the position is known, determined, and/or utilized to perform some in vehicle task. Also, Hirabayashi does not teach or suggest generating a safety system signal in

response to a known position of a sensor or through use of only a single sensor. The distance between the host vehicle and the target vehicle are determined without knowledge of the positions of the two light-receiving devices.

In Figures 1, 7, 8, 14, 19, and 21 of Hirabayashi a pair of light-receiving devices are utilized to determine distance between the host vehicle and a target vehicle using the multi-sensor method of Hirabayashi described above, see col. 10, lines 47-53. However, each light-receiving device is in the form of a series of optical sensor arrays instead of a single optical sensor array to improve inter-vehicle distance measurement accuracy. In none of the stated figures is the position of the light-receiving devices within the host vehicle determined or utilized to determine the inter-vehicle distance.

The Final Office Action states that Hirabayashi discloses the claimed invention except for the coordinates. Applicant submits that not only does Hirabayashi fail to disclose the coordinates of a vision sensor, Hirabayashi also fails to disclose: the use of only one vision sensor; the generation of a safety system signal in response to coordinates of a vision sensor; and the generation of a safety system signal in response to coordinates that refer to a known position of the vision sensor within a vehicle.

Although Hirabayashi determines inter-vehicle distance, which may be a result of the claimed invention, that does not suggest that the elements or techniques in which that result is derived or achieved are the same or even similar. As stated, Hirabayashi determines inter-vehicle distance utilizing multiple light-receiving devices and utilizing known distances between the lenses and the light-receiving devices, whereas the claimed invention generates a safety system signal utilizing the known coordinates or position within a vehicle of a single vision sensor.

The Final Office Action states that it would have been obvious to one of skill in the art to omit an element and its function in a combination such that the remaining elements perform the same function and this omission involves only routine skill in the art, and refers to *In re Karlson* 136 USPQ 184. In such stating, the Final Office Action implies or asserts that the use of a single vision sensor as

claimed is "common knowledge" or to use a single vision sensor would take only routine skill. Applicant submits that prior to the present invention it was generally understood in the art that in order to accurately determine inter-vehicle distance, when utilizing vision sensors, two or more vision sensors were needed, as is required in Hirabayashi. Hirabayashi requires the use of two or more light-receiving devices. One cannot simply remove or utilize only a single light-receiving device and the technique of Hirabayashi to determine inter-vehicle distance since known distances between light-receiving devices are needed in order to perform the technique of Hirabayashi. Thus, there is no reasonable expectation of success in utilizing a single light-receiving device and the technique provided in Hirabayashi. Referring to MPEP 2143.02, obviousness requires a reasonable expectation of success, *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). No such expectation exists in this case.

Also, the remaining elements of Hirabayashi do not perform the same function and are derived using different known parameters. As stated above, Hirabayashi utilizes known distances between lenses and light-receiving devices as opposed to a known position of a single vision sensor. Also, the calculations utilized due to the difference in known parameters, although not recited in the claims, performed by Hirabayashi and as stated in the specification of the present application are also different.

Furthermore, Applicant submits that the above opinion of *Karlson* is irrelevant in this case. In *Karlson* elements, namely a screen and a filler tube, are removed from a system and the system performs the same function, specifically water circulation and entrainment of chemical solution still function in the same manner. The end result, namely to provide concentrated and unconcentrated solutions, is also the same for the systems of both parties. However, in the present case by removing light-receiving devices from the system of Hirabayashi such that there is only a single light-receiving device not only does the system of Hirabayashi become inoperable it still performs different functions and uses different parameters than the claimed invention. Hirabayashi determines inter-vehicle distance in response to distances between lenses and distances between

lenses and light-receiving devices. The claimed invention generates a safety system signal in response to determined or known coordinates of a single vision sensor. Hirabayashi, simply put, performs different functions using different parameters to provide potentially the same or similar result as the claimed invention. Thus, although the omission of an element and its function in a combination is an obvious expedient if the remaining elements perform the same functions as before, since the elements of Hirabayashi do not perform the same functions as the claimed invention the opinion of *Karlson* does not apply.

Moreover, referring to MPEP 2144.03, official notice unsupported by documentary evidence should only be taken by the Examiner where the facts asserted to be well-known, or to be common knowledge in the art are capable of instant and unquestionable demonstration as being well-known, *In re Ahlert*, 424 F.2d 1088, 1091, 165 USPQ 418, 420 (CCPA 1970). The notice of facts beyond the record, which may be taken by the examiner, must be "capable of such instant and unquestionable demonstration as to defy dispute". The facts constituting the state of the art are normally subject to the possibility of rational disagreement among reasonable persons and are not amendable to the taking of such notice, *In re Eynde*, 480 F.2d 1364, 1370, 178 USPQ 470, 474 (CCPA 1973). General conclusions concerning what is "basic knowledge" or "common sense" to one of ordinary skill in the art without specific factual findings and some concrete evidence in the record to support these findings will not support an obviousness rejection, *Zurko* 258 F.3d at 1386, 59 USPQ2d at 1697. The Examiner must provide specific factual findings predicated on sound technical and scientific reasoning to support his or her conclusion of common knowledge, *Soli* 317 F.2d at 946, 37 USPQ at 801.

Applicant submits the elements of the claimed invention are not common knowledge and would not have been obvious to one skilled in the art. Hirabayashi is a prime example showing that the claimed elements are not common knowledge and the omissions of components of Hirabayashi would not involve routine skill. The omission of a light-receiving device in Hirabayashi does not allow one to arrive at the present invention since such omission renders

the system of Hirabayashi inoperable and since similar tasks are not performed. Applicant further submits that the Examiner has not provided any concrete evidence and sound technical and scientific reasoning to support her conclusion that the claimed elements are obvious.

Also, there is no motivation or suggestion in Hirabayashi to perform the necessary modifications thereof to arrive at the claimed invention. Referring to MPEP 2143.01, the mere fact that a reference can be modified does not render the resultant obvious unless the prior art also suggests the desirability thereof. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). There is no suggestion in Hirabayashi of reducing the number of vision sensors or to use only a single vision sensor. Also, to perform the techniques of Hirabayashi at least two light receiving devices are required.

Referring to MPEP 706.02(j) and 2143, to establish a *prima facie* case of obviousness the prior art reference(s) must teach or suggest all the claim limitations.

Thus, Applicant submits that Hirabayashi fails to teach or suggest each and every limitation of claims 1 and 9, therefore the combinations in claims 1 and 9 are not found in the prior art and each of the stated claims are believed to be independently patentable and allowable.

Claim 2 is believed to be independently patentable and allowable for the reasons set forth above since it depends from claim 1 and further recites the single vision sensor 14 is a single two-dimensional vision sensor. Hirabayashi fails to teach or suggest this combination.

Claim 3 is believed to be independently patentable and allowable for the reasons set forth above since it depends from claim 1 and further recites the single vision sensor 14 is a vision sensor selected from one of a camera, a charged coupled device, an infrared detector, a sensor that has a photodiode, and a complementary metal-oxide semiconductor. Hirabayashi fails to teach or suggest this combination.

Claim 4 is believed to be independently patentable and allowable for the reasons set forth above since it depends from claim 1 and further recites the

controller 16 performs an adaptive cruise control task in response to the safety system signal. Hirabayashi fails to teach or suggest this combination.

Claim 5 is believed to be independently patentable and allowable for the reasons set forth above since it depends from claim 1 and further recites the controller 16 determines position of the single vision sensor 14 relative to a predetermined reference on the vehicle 12. Hirabayashi fails to teach or suggest this combination.

Claim 6 is believed to be independently patentable and allowable for the reasons set forth above since it depends from claim 1 and further recites the controller 16 determines position of the single vision sensor 14 relative to a hoodline 42 of the vehicle 12. Hirabayashi fails to teach or suggest this combination.

Claim 7 is believed to be independently patentable and allowable for the reasons set forth above since it depends from claim 1 and further recites the controller 16 determines size and up-angle of the object and in response thereto determines range of the object. Hirabayashi fails to teach or suggest this combination.

Claim 8 is believed to be independently patentable and allowable for the reasons set forth above since it depends from claim 1 and further recites a memory 34 coupled to the controller 16 and stores a predetermined position of the signal vision sensor 14. Hirabayashi fails to teach or suggest this combination.

Claim 10 is believed to be independently patentable and allowable for the reasons set forth above since it depends from claim 9 and further recites determining position of a single vision sensor 14 includes determining distance between the single vision sensor 14 and a reference on the vehicle 12. Relative vertical positioning of the single vision sensor 14 is determined relative to the reference. Hirabayashi fails to teach or suggest this combination.

Claim 11 is believed to be independently patentable and allowable for the reasons set forth above since it depends from claim 9 and further recites initially as an assumed default, determining an object to be at a same elevation as the

vehicle 12, and generating an object detection signal in response to the initial determination.

The Final Office Action states that Hirabayashi does not teach determining an object to be at the same elevation as the vehicle. However, the Final Office Action states that Hirabayashi performs the same assumption recited in claim 11 and refers to col. 2, lines 65-67, and col. 3, lines 1-20 of Hirabayashi for such reliance. Applicant submits that nowhere in Hirabayashi is such an assumption stated or suggested. In col. 2, lines 65-67, and col. 3, lines 1-20, Hirabayashi discloses the simultaneous generation of images of three targets $O_1$, $O_2$, and $O_3$ within two regions and the determination of the distance of each target. Nowhere in determining the distances of the targets does Hirabayashi state or suggest that an assumption is made in which the targets are at the same elevation as the vehicle. In fact, Hirabayashi discloses determining target elevation and accounts for different elevations of targets, see Figures 9 and 14 and accompanying description. In cols 15 and 16, Hirabayashi states that patterns are monitored to detect elevation changes. Hirabayashi provides, as an example, the detection of a seam the utilization of a vehicle extraction road surface equation in response to that detection. In using the road surface equation, Hirabayashi accounts for target elevation or vehicle extraction road surface angle $\theta_{dete}$ by determining angle of the road surface and adding a constant $\beta$. Thus, Hirabayashi does not assume a target to be on the same elevation as a host vehicle, but rather determines the elevation of the target and therefore does not teach or suggest the claimed combination.

Claim 13 is believed to be independently patentable and allowable for the reasons set forth above since it depends from claim 9 and further recites determining the object to be at a different elevation than the vehicle 12 when the object appears to maintain a same height and width, but change in vertical position. Hirabayashi fails to teach or suggest this combination.

Claim 14 is believed to be independently patentable and allowable for the reasons set forth above since it depends from claim 9 and further recites determining object parameters and generating the safety system signal in

response to the object parameters. Hirabayashi fails to teach or suggest this combination.

Claim 15 is believed to be independently patentable and allowable for the reasons set forth above since it depends from claim 14 and further recites determining object parameters includes determining up-angle of the detected object. Hirabayashi fails to teach or suggest this combination.

Claim 16 is believed to be independently patentable and allowable for the reasons set forth above since it depends from claim 14 and further recites determining object parameters comprises determining size and up-angle of the object and in response thereto determining range of the object. Hirabayashi fails to teach or suggest this combination.

Claim 17 is believed to be independently patentable and allowable for the reasons set forth above since it depends from claim 14 and further recites determining object parameters includes determining a parameter selected from object range, range rate, height, width, size, and acceleration. Hirabayashi fails to teach or suggest this combination.

**B. THE REJECTION OF CLAIMS 4 and 18 UNDER 35 U.S.C. § 103(a)**

Claims 4 and 18 stand fully rejected under 35 U.S.C. § 103(a) over Hirabayashi in view of Breed.

Applicant submits that since claims 4 and 18 depend from claims 1 and 9, respectively, they are also independently patentable and allowable for the reasons set forth above. Neither of the references separately or in combination teaches nor suggests this combination.

**C. THE REJECTION OF CLAIMS 12 and 20 UNDER 35 U.S.C. § 103(a)**

Claims 12 and 20 stand fully rejected under 35 U.S.C. § 103(a) over Hirabayashi in view of Kurahashi.

Applicant submits that since claim 12 depends from claim 9, that it is also independently patentable and allowable for the reasons set forth above.

Applicant further submits that neither Hirabayashi nor Kurahashi teach or suggest alone or in combination the reduction of the speed of a vehicle in response to the detected increase in height and width of an object. The Final Office Action states that Kurahashi teaches speed adjustment in response to the change in distance between vehicles and states that this is the same as when the size of a detected object increases. Although in general when the distance of an object from a vehicle decreases the size of the object increases, the detection of distance change is not the same as the detection of height and/or size change. It cannot be implied that by detecting distance change that height and size change are also detected. As with Hirabayashi above, although the end result of adjusting vehicle speed may be the same, the functions or tasks performed prior to that end result are different. Thus, the recited elements and the claimed invention are also different than that disclosed by Kurahashi.

Applicant submits that since claim 12 depends from claim 9 and since Kurahashi, like Hirabayashi, fails to teach or suggest determining coordinates of only a single vision sensor on a vehicle, generating a safety system signal in response to the coordinates, generating a safety system signal in response to the coordinates and an object detection signal, and adjusting vehicle speed in response to change in object height and size, claim 12 is also independently patentable for the reasons provided in this section. Neither of the references separately or in combination teaches nor suggests this combination.

With respect to claim 20, the Office action relies on Hirabayashi for the teaching of all of the limitations of claim 20 except for the limitation of reducing the speed of the vehicle in response to range for which it relies on Kurahashi. Applicant submits that Kurahashi fails to teach or suggest performing a safety system task in response to a determined or known vision sensor position. Kurahashi simply detects an inter-vehicle distance and does not include, disclose, or suggest a vision sensor. Kurahashi is not concerned with nor does Kurahashi contemplate using the position of a distance detector, since inter-

vehicle distance can be determined without such knowledge when using a radar or an electromagnetic wave based system, as in Kurahashi. An electromagnetic wave based system is different than a vision based system. For example, inter-vehicle distance can be determined by measuring the time interval for an electromagnetic wave to be transmitted from a host vehicle, reflected off of an object, and received by the host vehicle, and using known electromagnetic wave travel speed information, as stated in col. 4, lines 13-24, as generally known in the art, and as performed by Kurahashi. On the other hand, a vision-based system typically uses triangulation or other spatial relationships between objects to determine distance, as is performed by Hirabayashi.

Also, Hirabayashi does not teach or suggest determining size and up-angle of an object in response to coordinates of a single vision sensor on a vehicle. As stated above, in col. 2, lines 65-67, and col. 3, lines 1-20, Hirabayashi discloses the simultaneous generation of images of three targets within two regions and the determination of the distance of each target. Size and up-angle of an object is not determined, disclosed, or suggested in the stated section. Applicant submits that elsewhere in Hirabayashi, Hirabayashi discloses determining elevation of an object, but the elevation is not determined in response to the coordinates of only a single vision sensor. Also, nowhere in Hirabayashi is the size of an object determined. Since Hirabayashi does not have knowledge of the position of a vision sensor, does not determine the position of a vision sensor, and does not determine the size of an object, Hirabayashi clearly does not teach or suggest determining size and up-angle of an object in response to coordinates of a single vision sensor on a vehicle.

Also, there is no motivation or suggestion in either Hirabayashi or Kurahashi to combine and modify the stated references to arrive at the claimed invention. Referring to MPEP 2143.01, the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Both Hirabayashi and Kurahashi fail to teach or suggest determining size and up-angle of an object in response to

coordinates of a single vision sensor on a vehicle, determining range of the object in response to the size and the up-angle, and reducing the speed of the vehicle in response to the range. Hirabayashi uses light-receiving devices and Kurahashi uses electromagnetic wave sensors. One would not perform the techniques of Hirabayashi when using the sensors of Kurahashi and one would not perform the techniques of Kurahashi when using the light-receiving devices of Hirabayashi. There is no suggestion in either Hirabayashi and Kurahashi for any combination and modification thereof or does the combination of each reference allow one to arrive at the present invention as is claimed.

Therefore since, both Hirabayashi and Kurahashi fail to teach or suggest each and every element of claim 20, the *prima facie* case of obviousness has not been met, the combinations in claim 20 are not found in the prior art, and claim 20 is also independently patentable. Neither of the references separately or in combination teaches nor suggests this combination.

## VIII. Appendix

A copy of the claims involved in this appeal, namely claims 1-20 is attached hereto as Appendix A.

## IX. Conclusion

For the reasons advanced above, Appellants respectfully contend that each claim is patentable. Therefore reversal of the rejection is requested.

Respectfully submitted,

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# APPENDIX A

What is claimed is:

1. A sensing system for a vehicle comprising:

a single vision sensor having a position with coordinates on the vehicle, detecting at least one object, and generating at least one object detection signal; and

a controller coupled to said vision sensor and generating a safety system signal in response to said coordinates and said at least one object detection signal.

2. A system as in claim 1 wherein said single vision sensor is a single two-dimensional vision sensor.

3. A system as in claim 1 wherein said single vision sensor is a vision sensor selected from one of a camera, a charged coupled device, an infrared detector, a sensor having at least one photodiode, and a complementary metal-oxide semiconductor.

4. A system as in claim 1 wherein said controller performs an adaptive cruise control task in response to said safety system signal.

5. A system as in claim 1 wherein said controller determines position of said single vision sensor relative to a predetermined reference on the vehicle.

6. A system as in claim 1 wherein said controller determines position of said single vision sensor relative to a hoodline of the vehicle.

7. A system as in claim 1 wherein said controller determines size and up-angle of said at least one object and in response thereto determines range of said at least one object.

8. A system as in claim 1 further comprising a memory coupled to said controller and storing a predetermined position of said signal vision sensor.

9. A method of performing safety system operations within a vehicle comprising:

determining coordinates of only a single vision sensor on the vehicle;

detecting at least one object with said single vision sensor and generating

at least one object detection signal; and

generating a safety system signal in response to said determined coordinates and said at least one object detection signal.

10. A method as in claim 9 wherein determining position of a single vision sensor comprises:

determining distance between the single vision sensor and a reference on the vehicle; and

determining relative vertical positioning of said single vision sensor relative to said reference.

11. A method as in claim 9 further comprising:

initially as an assumed default, determining said at least one object to be at a same elevation as the vehicle; and

generating said object detection signal in response to said initial determination.

12. A method as in claim 9 further comprising reducing traveling speed of the vehicle when height and width of said object appear to increase in size.

13. A method as in claim 9 further comprising determining said at least one object to be at a different elevation than the vehicle when said at least one object appears to maintain a same height and width, but change in vertical position.

14. A method as in claim 9 further comprising determining object parameters and generating said safety system signal in response to said object parameters.

15. A method as in claim 14 wherein determining object parameters comprise determining up-angle of said detected object.

16. A method as in claim 14 wherein determining object parameters comprises determining size and up-angle of said at least one object and in response thereto determining range of said at least one object.

17. A method as in claim 14 wherein determining object parameters comprises determining at least one parameter selected from object range, range rate, height, width, size, and acceleration.

18. A method as in claim 9 wherein generating a safety system signal comprises generating an adaptive cruise control signal.

19. A method as in claim 9 further comprising determining orientation of said single vision sensor and generating said safety system signal in response to said orientation.

20. An adaptive cruise control system for a vehicle comprising:

a single vision sensor having a position with coordinates on the vehicle, detecting at least one object, and generating at least one object detection signal; and

a controller coupled to said vision sensor, determining size and up-angle of said at least one object in response to said coordinates and said at least one object detection signal, and in response thereto determining range of said at least one object;

wherein said controller reduces speed of the vehicle in response to said range.

PTO/SB/17 (12-04)
Approved for use through 07/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE


*Effective on 12/08/2004.*
*Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).*

# FEE TRANSMITTAL
## For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

| TOTAL AMOUNT OF PAYMENT | ($) 500.00 |
|---|---|

| Complete if Known | |
|---|---|
| Application Number | 10/707,569 |
| Filing Date | December 22, 2003 |
| First Named Inventor | Jeffrey D. Rupp |
| Examiner Name | Olga Hernandez |
| Art Unit | 3661 |
| Attorney Docket No. | 81082145 (FGT 1852 PA) |

**METHOD OF PAYMENT** (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☑ Deposit Account Deposit Account Number: 06-1510 Deposit Account Name: Ford Motor Company

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☑ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

☑ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☑ Credit any overpayments

**WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**

**FEE CALCULATION**

**1. BASIC FILING, SEARCH, AND EXAMINATION FEES**

| | FILING FEES | | SEARCH FEES | | EXAMINATION FEES | | |
|---|---|---|---|---|---|---|---|
| Application Type | Fee ($) | Small Entity Fee ($) | Fee ($) | Small Entity Fee ($) | Fee ($) | Small Entity Fee ($) | Fees Paid ($) |
| Utility | 300 | 150 | 500 | 250 | 200 | 100 | |
| Design | 200 | 100 | 100 | 50 | 130 | 65 | |
| Plant | 200 | 100 | 300 | 150 | 160 | 80 | |
| Reissue | 300 | 150 | 500 | 250 | 600 | 300 | |
| Provisional | 200 | 100 | 0 | 0 | 0 | 0 | |

**2. EXCESS CLAIM FEES**

| Fee Description | Fee ($) | Small Entity Fee ($) |
|---|---|---|
| Each claim over 20 or, for Reissues, each claim over 20 and more than in the original patent | 50 | 25 |
| Each independent claim over 3 or, for Reissues, each independent claim more than in the original patent | 200 | 100 |
| Multiple dependent claims | 360 | 180 |

| Total Claims | Extra Claims | Fee ($) | Fee Paid ($) |
|---|---|---|---|
| _____ - 20 or HP = | _____ | x _____ | = _____ |

HP = highest number of total claims paid for, if greater than 20

| Indep. Claims | Extra Claims | Fee ($) | Fee Paid ($) |
|---|---|---|---|
| _____ - 3 or HP = | _____ | x _____ | = _____ |

HP = highest number of independent claims paid for, if greater than 3

| Multiple Dependent Claims | |
|---|---|
| Fee ($) | Fee Paid ($) |
| _____ | _____ |

**3. APPLICATION SIZE FEE**

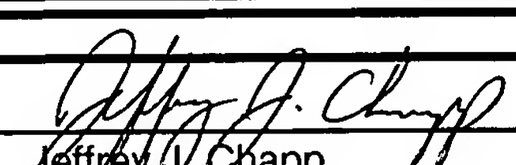
If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

| Total Sheets | Extra Sheets | Number of each additional 50 or fraction thereof | Fee ($) | Fee Paid ($) |
|---|---|---|---|---|
| _____ - 100 = | _____ | / 50 = _____ (round up to a whole number) | x _____ | = _____ |

**4. OTHER FEE(S)**

| | Fees Paid ($) |
|---|---|
| Non-English Specification, $130 fee (no small entity discount) | |
| Other: Appeal Brief | 500.00 |

**SUBMITTED BY**

| | | | |
|---|---|---|---|
| Signature |  | Registration No. (Attorney/Agent) 50,579 | Telephone 248-223-9500 |
| Name (Print/Type) | Jeffrey J. Chapp | | Date April 11, 2005 |

AF IZW

PTO/SB/21 (09-04)
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# TRANSMITTAL FORM

*(to be used for all correspondence after initial filing)*

Total Number of Pages in This Submission

| | |
|---|---|
| Application Number | 10/707,569 |
| Filing Date | December 22, 2003 |
| First Named Inventor | Jeffrey D. Rupp |
| Art Unit | 3661 |
| Examiner Name | Hernandez |
| Attorney Docket Number | 810821465 (FGT 1852 PA) |

## ENCLOSURES *(Check all that apply)*

- [x] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
  - [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [x] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [ ] Other Enclosure(s) (please Identify below):

Remarks

## SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

| | | | |
|---|---|---|---|
| Firm Name | Artz & Artz, P.C. | | |
| Signature | Jeffrey J. Chapp | | |
| Printed name | Jeffrey J. Chapp | | |
| Date | April 11, 2005 | Reg. No. | 50,579 |

## CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:

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| Signature | Jo Anne Croskey | | |
| Typed or printed name | Jo Anne Croskey | Date | April 11, 2005 |